Attachment 4

May 22, 2003

To Whom It May Concern:

Using search tools through the University of Idaho, Oregon State University, and University of Washington I found many articles that are associated to questions asked during Dr. Partridge's May 13, 2003 visit to Farragut State Park. After searching for definitive answers concerning the specific correlation between the brush species and conifer species that inhabit Farragut State Park I have had little success. I have contacted professors from the University of Idaho, Washington State University, and University of Washington. All of which made assumptions concerning the issue of Farragut's brush/conifer relationship, but none could substantiate the assumptions through studies that have been completed. I also contacted the Idaho Panhandle N.F. Silviculturist, Geologist, and Soil Scientist, as well as the Panhandle BLM Soil Scientist and Silviculturist and none could give a definitive answer with studies that validate their assumptions. If individuals would like further information pertaining to Farragut's forest characteristics I would suggest searching online through the above mentioned library websites.

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Does brush have an impact on tree health and soil moisture?
Meinzer, F.C., (2002). Hydraulic redistribution of soil water during summer drought in two contrasting Pacific Northwest coniferous forests. Tree Physiology, 22 (1107-1117).

In a 20-year-old Douglas-fir stand approximately 28% of the water removed daily from the upper 2m of soil was replaced by nocturnal hydraulic redistribution during late August. In an old-growth ponderosa pine stand, approximately 35% of the total daily water utilization from the upper 2m of soil appeared to be replaced by hydraulic redistribution during July and August. By late September, hydraulic redistribution in the ponderosa pine stand was no longer apparent, even though total water use from the upper 2m of soil was nearly identical to that observed earlier. The findings were that co-occurring shallow-rooted plants ceased hydraulic redistribution in the ponderosa pine.

Therefore, hydraulic redistribution may enhance seedling survival and maintain overstory transpiration during summer drought. These first approximations of the extent of hydraulic redistribution in these ecosystems suggest that it is likely to be an important process in both wet and dry forests of the Pacific Northwest.

Can old tree's still grow?
Latham, P.; Tappeiner, J., (2002). Response of old-growth conifers to reduction in stand density in western Oregon forests. Tree Physiology, 22 (137-146).

This study tested the null hypothesis that old-growth trees are incapable of responding with increased growth following density reduction. The diameter growth response of 271 Douglas-fir and ponderosa pine trees ranging from 158 to 650 years was examined 20 to 50 years after density reduction. Density reduction involved either light thinning with the removal of less vigorous trees, or shelterwood treatments in which overstory trees were not removed. Ratios of basal area growth after treatment to basal area growth before treatment, and several other measures of growth, all indicated that the old trees sometimes benefited and were not harmed by density reduction. Growth increased by 10% or more for 68% of the trees treated in the stands, and nearly 30% of trees increased growth by over 50%. During the 20 year period, only three trees in treated stands (1.5%) exhibited a decrease in growth, whereas growth decreased in 64% of trees in untreated stands. The length of time before growth response to density reduction varied from 5 to 25 years, with the greatest growth response occurring 20 to 25 years after treatment.

Will mycorrhizae be affected by restoration of ponderosa pine?
Korb, JE.; Johnson, NC.; Covington, WW. (2003). Arbuscular mycorrhizal propagule densities respond rapidly to ponderosa pine restoration treatments. Journal of Applied Ecology. 40 (101-110).

These results indicated that population densities of AM fungi can rapidly increase following restoration treatments in northern Arizona ponderosa pine forests. This has important implications for restoring the herbaceous understory of these forests because most understory plants depend on AM associations for normal growth. These results also can be applied to other ecosystems that are in a state of restoration or where the role of fire is just beginning to be understood.

Do understory plants affect soil moisture?
Orr, HK; (1968). Soil moisture trends after thinning and clearcutting in a second-growth ponderosa pine stand in the Black Hills. U.S. For. Serv. Res. Note Rocky Mt. For. Range Exp. Sta. No. RM-99, (8).

Thinning from 190 sq. ft. b.a. and nearly 2,000 trees/acre to 80 sq. ft. and 435 trees did not apparently induce free water seepage to ground water in dry years when the unthinned stand did not yield seepage. Thinning reduced the soil moisture depletion, and hence increased the seepage potential. Clear felling and maintenance in bare condition

apparently induced free water seepage. Subsequent establishment of a weed and brush component reduced seepage yield potential, but remained higher than unthinned portions of the stand.

Cont. Do understory plants affect soil moisture?

Conard, SG.; Sparks, SR.; Regelbrugge, JC.; (1997). Comparative plant water relations and soil water depletion patterns of three seral shrub species in SW Oregon. Forest Science. 43 (336-347).

Findings determined that Arctostaphylos patula, Ceanothus sanguineus, and Holodiscus discolor are strong competitors for soil moisture. These three species are capable of depleting moisture from deeper in the soil (1m to 3m) and may, therefore, strongly compete even inhibit conifer transpiration, photosynthesis, and growth.

Wilm, HC.; (1943). Soil moisture under a coniferous forest. Trans. Amer. Geophy. Union 1943 Pt. III (11-3). Rocky Mountain Forest and Range Research Sta. No. RM-92, (14)

The greatest soil moisture deficiencies are those of uncut forests due to precipitation interception of forest understory vegetation rather than variations in the sum of transpiration and evaporation.